CLAIMS

What is claimed is:

1. A missile comprising:

a payload assembly; and

one or more booster stages separably coupled to the payload assembly;

wherein the payload assembly includes at least two nosecones.

2. The missile of claim 1,

wherein the at least two nosecones include an outer nosecone and an inner nosecone; and

wherein the inner nosecone is located at least partially within the payload assembly, internal to the outer nosecone.

3. The missile of claim 2, wherein the outer nosecone has a more streamlined shape than the inner nosecone, the outer nosecone thereby having a lower coefficient of drag than the inner nosecone.

4. The missile of claim 2, wherein the outer nosecone has a sharper cone angle than the inner nose cone.

5. The missile of claim 2, wherein the outer nosecone has an outer nose cone angle of between about 5 degrees and about 10 degrees.

6. The missile of claim 5, wherein the outer nosecone has an outer nose cone angle of between about 30 degrees and about 50 degrees.

7. The missile of claim 2, wherein the outer nosecone has a different separation mechanism from that of the inner nosecone.

8. The missile of claim 2, wherein the outer nosecone includes outer nosecone petals that are configured to hingedly rotate and separate from the payload assembly.

9. The missile of claim 8, wherein the payload assembly includes a piston actuator coupled to the outer nosecone petals, for initiating separation of the outer nosecone petals.

10. The missile of claim 9, wherein the piston actuator is in a forward half of the outer nosecone.

11. The missile of claim 8, wherein the inner nosecone includes inner nosecone petals and a detonating charge for destroying the integrity of the inner nosecone petals.

12. The missile of claim 11, wherein the inner nosecone petals are hermetically sealed with one another prior to detonation of the detonating charge.

13. The missile of claim 2, wherein the outer nosecone includes outer nosecone petals made of a composite material that is configured to ablate during hypersonic ascent through air, to thereby provide thermal protection for the outer nosecone.

14. The missile of claim 13, wherein the inner nosecone includes inner nosecone petals made of aluminum.

15. The missile of claim 1, wherein the payload assembly includes an attitude control system.

16. The missile of claim 15, wherein the payload assembly also includes a rocket motor.

17. A method of operating a missile during flight, the method comprising:

exposing to atmosphere, during a first phase of the flight, an outer nosecone of a payload assembly of the missile;

separating the outer nosecone from the payload assembly following the first phase of the flight, thereby exposing an inner nosecone of the payload assembly; and

continuing flight of the missile during a second phase of the flight.

18. The method of claim 17, wherein the first phase is a relatively low-altitude phase, at a lower altitude than the second phase.

19. The method of claim 18, wherein the first phase of the flight includes substantially all of the flight at an altitude of up to about 50 km.

20. The method of claim 18, wherein the first phase includes boosting of the missile by one or more boost stages of the missile, which are separably coupled to the payload assembly.

21. The method of claim 17, wherein the continuing flight includes maneuvering the missile toward a target.

22. The method of claim 21, wherein the maneuvering includes maneuvering the missile toward a moving target.

23. The method of claim 21, wherein the separating includes moving a center of pressure of the payload assembly aftward and in closer proximity to a center of gravity of the missile.

24. The method of claim 23,

wherein the continuing flight includes guided coast flight of the payload assembly;

wherein the guided coast flight includes intermittently firing a rocket motor that is part of the payload assembly; and

wherein the guided coast flight includes actuating an attitude control system of the payload assembly to maneuver the payload assembly on a desired course.

25. The method of claim 17, wherein the separating occurs during a coast portion of the flight, after firing of a booster stage coupled to the payload assembly ceases and before separation of the booster stage.

26. The method of claim 17, wherein the separating includes:

hingedly rotating outer nosecone petals of the nosecone; and

using aerodynamic forces to separate the outer nosecone petals from the payload assembly.

27. The method of claim 26, wherein the hingedly rotating is initiated by actuation of a piston actuator in a forward half of the outer nosecone, wherein the actuation of the piston actuator pushes the outer nosecone petals apart from one another.

28. The method of claim 17, further comprising separating the inner nosecone from the payload assembly at completion of the second phase of the flight, wherein the second phase of the flight is completed at an altitude of at least about 90 km.